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GEOGRAPHIC SCHOOL BULLETINS

Published Weekly by

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NOTE TO TEACHERS—Because of the Christmas holidays, the GEOGRAPHIC SCHOOL BULLETINS will not be published for the next two weeks, resuming on January 8, 1945.

GOLD "HORN" HATPINS HOLD HER CAP AS THIS LEVEL-EYED, LEVEL-HEADED NETHERLANDER LOOKS SEAWARD

She is the wife, daughter, and sister of fishermen who were with the peacetime herring fleet that put out from Scheveningen, the seaside section of the Netherlands' capital city, 's Gravenhage (The Hague).

Her earrings match the gold hatpins projecting like horns from her pleated white bonnet, which is made by a snug pattern appropriate to her windy seaside home. Scheveningen's stretches of wet sand, slate-colored sea, and large flat-bottomed boats have been favorite subjects for landscape artists. Season after season summer visitors greatly outnumbered permanent residents in this section of 's Gravenhage. Peacetime vacationists, mostly from elsewhere in the country and from Germany, made it the most popular resort of the Netherlands (Bulletin No. 3).

De Haas from Three Lions

GEOGRAPHIC SCHOOL BULLETIN

HOW TEACHERS MAY OBTAIN THE BULLETINS

The Geographic School Bulletins are published weekly throughout the school year (thirty issues) and will be mailed to teachers in the United States and its possessions for one year upon receipt of 25 cents (stamps or money order); in Canada, 50 cents. Originally entered as second-class matter January 27, 1922; re-entered as of April 27, 1943, Post Office, Washington, D. C., under Act of March 3, 1879. Copyright, 1944, by National Geographic Society, Washington, D. C. International copyright secured. All rights reserved. Quedan reservados todos los derechos.

The Industrial Saar, Like the Ruhr, Is Prize of Modern War

GERMANY'S Saar, where the U. S. Third Army has been at grips with the Germans, is a natural corridor leading toward the heart of the Rhineland. The Saar ranks as one of the half-dozen foremost coal mining and industrial areas in continental Europe.

From Roman times, armies have surged across this low, hilly region lying between higher hills and mountain ranges that overshadow it on the northwest and southeast. Caesar, Charlemagne, and Napoleon used the Saar valley as a highway to conquest. Modern mechanized warfare, based on industry, makes the region itself a great military objective.

As the Allies advance in the Saar, the Nazis lose one of their three fabulously productive industrial basins—the other two being the Ruhr and Silesia.

Densely Settled Crossroads of Commerce and Industry

The Saar, as set apart from Germany by the Treaty of Versailles, was a roughly oval district along the northern frontier of the long-contested buffer region of Alsace-Lorraine. It included the valleys of the Saar River and its principal tributaries. Since being returned to Germany after a plebiscite in 1935, it has been incorporated with adjoining territory extending eastward to the Rhine into a larger political subdivision known as the Saarland.

Saarbrücken, the chief city of the historic Saar district, lies less than 80 miles southwest of Mainz, the nearest Rhine River city. To the west, recently captured Metz is 36 miles away.

Five railway lines and five main highways converge at Saarbrücken. The Saar River, on which the city stands—source of the popular designation for the district, "Saar Basin"—flows northwestward to join the Mosel. The Mosel, in turn, reaches the Rhine below Mainz. Most of the railways and highways that cross the Saar extend in a generally northeast direction toward the Rhine valley.

The historic Saar district covers less than 800 square miles. With a population of well over 800,000, this means that there are more than 1,000 persons per square mile. Rhode Island, most densely populated of our 48 States, has only 667 persons per square mile.

Normally mining and steel making furnish a living for about 90 per cent of the Saar's people. In peacetime, the industries made considerable use of the near-by rich deposits of Lorraine iron ore. This French ore field had been in German hands since the 1940 fall of France. The Saar supplied the Nazi war machine with steel, coal gas, machinery, glass, chemicals, and other materials.

Saar Mines Awarded to French as Reparations

The Saar, which has mined coal since the Middle Ages, was in German hands preceding the first World War. The Treaty of Versailles separated it from Germany and provided for a 15-year period of government by a League of Nations Commission. In 1935, after this period of being literally without a country, a plebiscite was held, as provided for by the treaty, to determine the future status of the territory. The Saarlanders voted to return to the Reich.

As reparations for German damage to French coal mines in the first World War, France was awarded ownership of all Saar mines. France held the mines until 1934, when Germany bought them back, arranging for additional payments

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Willard Price

BOTH THE PLANE AND THE PIGEON ROOSTED ON THE ROOF OF TOKYO'S MODERN NEWSPAPER OFFICE

Tokyo's daily newspaper, *Asahi*, takes shape in a modern structure built to withstand earthquake and fire. The broad roof before the war served as a parking lot for pigeons and an airplane, the old and the new in communications. Carrier pigeons stood by to accompany reporters on ships at sea or to remote regions where no telephones were available; the pigeons flew back to the city editor with news stories in tubes tied to their legs. The plane did not fly. It stood on the roof to commemorate a plane flight from Tokyo to London which was sponsored by *Asahi* in the peacetime period before Tokyo became a target for Allied bombers (Bulletin No. 5).

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Beating Up Christmas Fruitcake Stirs Trade Tides

TODAY'S Jack Horner would never fish around in a Christmas pie for a plum if he could carve himself a slice of Christmas fruitcake. Instead of a mere plum, this cosmopolitan cake offers him delicacies from a dozen lands.

Of course a confection would not sound appetizing if its ingredients were itemized to include bits of bark, a prune pit, orchid seed, shriveled grapes, and a dried tree bud. But in fruitcake Jack Horner would recognize these as cinnamon, almonds, vanilla, currants, and cloves. Similar surprises would reward his investigating the origin of other fruits, nuts, and spices of the catchall cake which is by now a prominent feature of Christmas hospitality.

Citron, Lemon's Green Grandmother, a Gift of India and Italy

Before man invented writing, woman invented fruit desserts. With the ancient Chinese it was oranges. With early Egyptians it was dates. For Jack Horner, topping off Christmas dinner with fruitcake, it is all these and many more, some of which have been brought to their present delectability in modern times.

A half-wheel of candied pineapple decorating the cake is likely to be Hawaiian or Cuban by birth and Brazilian by ancestry. Before war brought the Hawaiian Islands grimmer business, they were the source of four-fifths of world trade's pineapples. Cuba also passed the pineapple to United States tables.

When Columbus discovered the pineapple, it was a puny, seedy fruit little larger than the pine cone for which it is named. Wild relatives in its probable home—forested highlands of Brazil and Paraguay—are no larger now. Travel proved broadening for pineapples, which grew in size and flavor after being transplanted to the Netherlands Indies and later, during the past century, to Hawaii.

Translucent green slivers of citron were prewar presents to fruitcake from India, Italy, and Greece. This venerable ancestor of the citrus family, whose farther-flung relative is the lemon, is presumed to have sprung from prehistoric India. Medes and Persians passed the fragrant thick-skinned fruit along to Greece. Gardeners in Italy were tending it 1,500 years ago. Before the war Italy shipped tons to the United States. Greece, Palestine, and Cuba were other sources.

Indian Braves Pointed the Way to the Pecan

While raisins, like many other ingredients stirred into the fruitcake, are grown in the United States, quantities are nevertheless imported. Though Spain is famous for sweet raisins sun-dried on their native vines, Turkey, Australia, and Greece have been ahead in supplying the fruit to American tables. In Central Asia not far from Turkey, grapes may have been first cultivated by prehistoric man, before Phoenician sailors introduced them into Egypt and Europe. More than a million pounds of the seedless type called the currant, shipped from and named for Corinth, still reached the United States yearly from prewar Greece.

The fruit of the cake's maraschino cherry no doubt grew on American trees, but the maraschino process was worked out for the *marasca*, the wild sour cherry of Yugoslavia's Dalmatian coast.

Walnuts, almonds, and pecans too may be home-grown. The pecan, growing wild, was named and introduced to early settlers by Indians who appreciated forest fare. The so-called English walnut, however, reached this country on the last lap of a long journey from Asia. Ancient Greeks learned of it from Persia. Now it is

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in the form of annual shipments of coal until 1939.

In language and custom, nearly all of the Saar's people are German. Before 1914 only about one in every 200 people spoke French as a native tongue. French cultural influence was slight even in Saarlautern (Saarlouis), with its old forts and architectural relics dating from the time of Louis XIV.

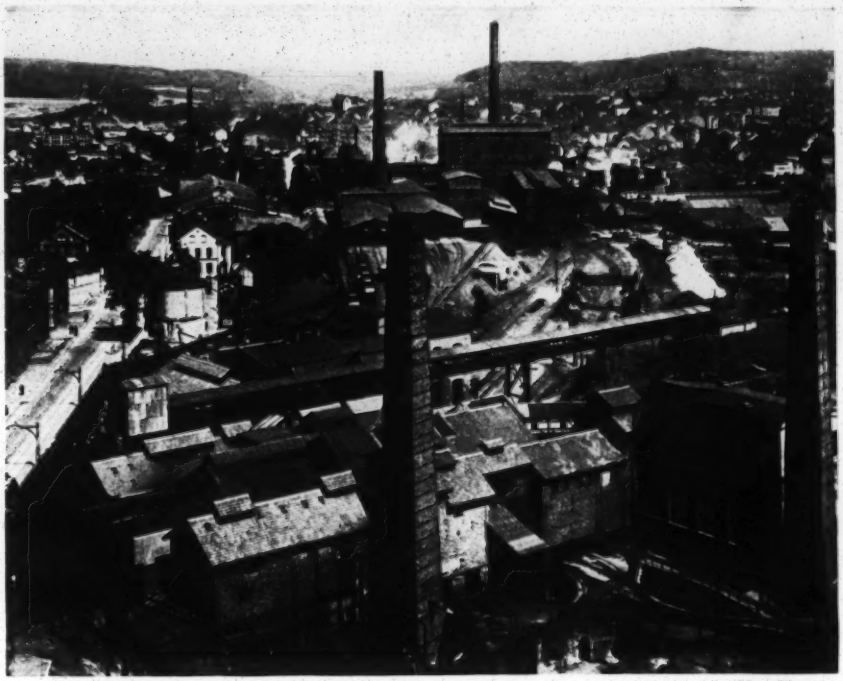
Saarlautern lies 12 miles down the Saar River from Saarbrücken. Old residents speak a curious blend of German and French. The word "umbrella," for instance, *parapluie* in French and *regenschirm* in German, is sometimes heard as *parplischirm* in Saarlautern.

In spite of the density of its population, the Saar has few large cities. Saarbrücken counts only 135,000 inhabitants. Other cities, none of which surpass the 40,000 mark, include Neunkirchen (illustration, below), Völklingen, Sulzbach, and Merzig.

Note: The Saar is shown on the National Geographic Society's Map of Germany and Its Approaches, which appeared as a supplement to the July, 1944, issue of the *National Geographic Magazine*. A price list of maps may be obtained from the Society's headquarters, Washington 6, D. C.

For further information, see "What Is the Saar?" in the *National Geographic Magazine* for February, 1935*; and "Germany's Rhineland of Prime Military Value," in the GEOGRAPHIC SCHOOL BULLETINS, October 2, 1944. *(Issues marked with an asterisk are included in a special list of Magazines available to teachers and librarians in lots of ten for $1.00.)*

Bulletin No. 1, December 18, 1944.



Max Wentz

THE SAAR'S CITIES, THOUGH MIDGETS IN SIZE, ARE GIANTS IN INDUSTRY

Busy steel mills make Neunkirchen the Saar's second-largest city, with 39,000 inhabitants. In prewar times, many of its citizens worked in these plants, which were owned by the Von Stumm family. This family, like the Krupps in the Ruhr, were prominent in developing the giant industries of the Saar. Unlike the Ruhr, where cities of several hundred thousand people lie cheek by jowl for a distance of 40 miles, the Saar's only metropolis is Saarbrücken, with 135,000 inhabitants. Wooded hills (background) illustrate another distinction of the Saar—that its heavy industry has been literally carved out of a dense forest.

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Yanks in Europe: 3. The Netherlands

(This is the third of a new series of bulletins about European countries where Yanks are fighting.)

THE Netherlands, alone among the nations of Europe, tells much of its story in its very name. These are the *nether lands*—lands once beneath the sea.

Not all the area of the Netherlands is below sea level, but roughly the western two-fifths of it is. For centuries this section contained the most fertile and most valuable land, the greatest and most historic cities, the densest population. Most of this low, carefully cultivated, canal-laced region, so typical of the Netherlands of peacetime, lies within the provinces of South Holland and North Holland. Nearly half of the Netherlands' prewar population of about eight million lived in these two divisions.

It was into this region that tens of thousands of visitors used to pour. Few of them wandered beyond its borders. That tourist emphasis on the two Hollands, as well as the greater familiarity of Netherlanders themselves with the low country, is why the entire kingdom is generally—and inaccurately—called "Holland."

The Only Hills Are Far South

The rest of the country consists of Zeeland, the sea islands, once mud flats, that were made safe from the waves by dikes along their edges; the relatively low areas of the south along the Rhine and Maas rivers (illustration, below); the middle regions, slightly above sea level; and the provinces along the German border that are chiefly upland plains, some of them infertile and sparsely settled. The northern fringe, including Friesland, again is low, and must be protected by dikes.

In the extreme south is a narrow tail of land, the Province of Limburg, that seems strangely out of step with the rest of the country. It is hilly, and near Maastricht has valuable coal deposits.

The entire kingdom covers less than 13,000 square miles, about the area of Massachusetts and Connecticut combined. But it carries on its books, as it were, a huge overseas empire, 60 times as large as the mother country. The Netherlands Indies, including the large, rich islands of Java and Sumatra, almost make a land bridge between southeast Asia and Australia. Other bits of Netherlands territory lie in the Western Hemisphere: Surinam, on the north coast of South America, and Curaçao and five other small islands in the West Indies.

The Netherlanders fought long and stubbornly against alien Spanish rulers in the 16th and 17th centuries, and finally won their independence in 1648. They were overrun by the French under Napoleon, and after his defeat their country combined with Belgium. The two nations separated in 1830.

Effort to Discourage Use of "Dutch"

Those parts of the western Netherlands which have escaped flooding are sure to attract any Yanks who have freedom for visiting. They will want to see the country's metropolis, Amsterdam; Rotterdam, chief port; 's Gravenhage (The Hague), the capital; Alkmaar and Edam, homes of well-known cheeses; the historic cities of Haarlem, Delft, and Leiden; and the seaside resort of Scheveningen, Atlantic City of the Netherlands (illustration, cover).

There in the west, Yanks will meet typical Netherlanders, whom they probably will call "Dutchmen." They will hear the people refer to themselves in the same way. It will seem reasonable enough, for "Dutch" is rooted deep in history and literature. But in recent years the Netherlands Government has discouraged use of the term, doubtless because some outsiders confuse it with "Deutsch," the name of hated German neighbors to the east.

During the past 900 years or more the forebears of these people virtually built their land by hand: walling out the sea and the rivers, constructing canals, pumping out the seepage and the rain water. Year in and year out they had to continue hard work to keep the land livable and productive. If canals were clogged or dikes were broken, or if pumps stopped even for a few days, large areas would become waterlogged and worthless.

Probably the greatest reclamation project took shape in 1932 with the completion of a 20-mile-long dam across the mouth of the old Zuider Zee between North Holland on the west and Friesland on the east. This old arm of the sea, cut off by the huge dike, will eventually become a fresh-water lake. Its name already has been changed to IJssel Meer (lake).

It was not apparent in peacetime that much of the western Netherlands was below sea level.

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normally the most valuable commercial tree nut crop of the United States.

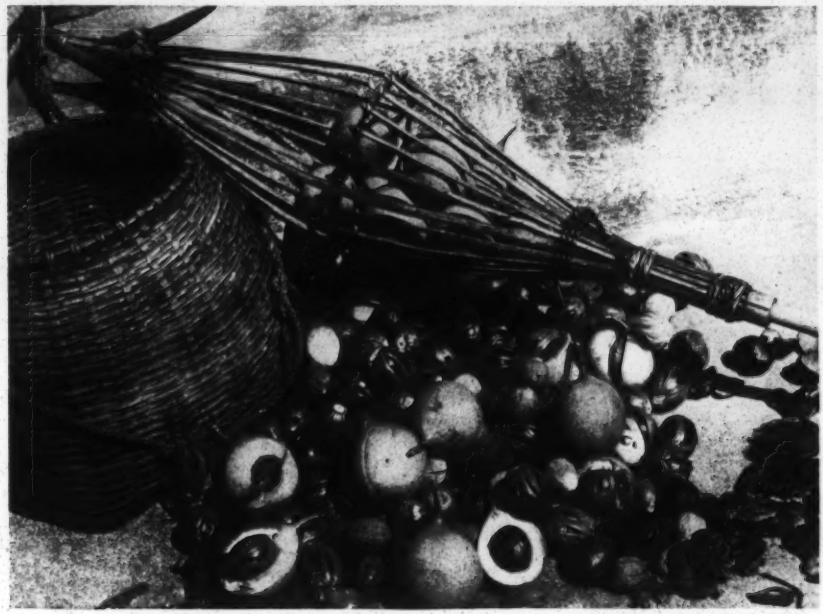
For long the almond was an exotic, the thin-shelled pit of a downy Mediterranean fruit like the apricot and the prune. Now almond groves blossom and bear in California. Yet before the war the United States imported more than a million pounds, most from Spain and Italy, some from France, Portugal, and Morocco.

While fruit gives the Christmas cake its name, much of its flavor is the gift of cloves, mace (illustration, below), and vanilla. Cloves are the dried bud of a tree native to the Netherlands Indies but now transplanted. The sources for most United States imports are Zanzibar and Madagascar, far from the "Spice Isles" where Magellan's ships took on their historic cargo of cloves.

Most cinnamon must voyage from Ceylon or India, where it is prepared from the thin crisp bark of small twigs. Vanilla is an early American flavoring, developed by Indians in Mexico from the long thin seed pod of an orchid. Mexico's vanilla exports are now surpassed by shipments from Madagascar.

Note: For additional information on food, see "Revolution in Eating," in the *National Geographic Magazine* for March, 1942. Other Christmas traditions are discussed in these GEOGRAPHIC SCHOOL BULLETINS: "Christmas Candies Short on Mint," December 13, 1943; "Christmas Comes with the Kings, South of the Border," December 14, 1942; and "Pesky Mistletoe Makes Christmas Merry and Mischievous," December 15, 1941.

Bulletin No. 2, December 18, 1944.



Maynard Owen Williams

A TWO-PRONGED BASKET PICKS TWO-FLAVORED FRUIT FROM THE NUTMEG TREE

The far-renowned "golden apples" of the nutmeg tree split into halves (left of center) when ripe and spill out their double spice treasure. The blood-red, rubbery network enclosing the seed is mace. When it flattens and dries (right), it is sprinkled with sea water to make it pliable and to accentuate the delicate flavor it later conveys to Christmas fruitcakes. The kernel within the mace is the spicy, crinkled brown nutmeg. Until the end of the 17th century, Dutch planters in the Molucca group of the Netherlands Indies had a monopoly of these two spices. Then the Moluccas fell into British hands and the kidnapped nutmeg tree was introduced into British colonies. In recent years more than half of the world's tons of mace and nutmeg grew on the island of Grenada in the British West Indies. Most of the remainder came from Banda in the Moluccas. On Grenada the fruit is allowed to ripen on the tree, and the dropped seed is picked up from the ground. On Banda the nutmeg apple is gathered with a picking pole; two prongs (upper left) pull the fruit into a bamboo basket on the end of a long pole.

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Sprinting, then Loafing, the Sun Races Clocks

THE shortest day of the year—December 21 in 1944—will usher in a period of perennial puzzlement to amateur astronomers. For this is a time when the usually steady sun bewilders many observers with its apparent antics.

The logical thing to expect is that the days will grow longer. They do. The logical way for days to grow longer is for the sun to rise earlier and to set later. It doesn't. Rather, it doesn't seem to.

Lazy Sun Refuses to Rise Earlier

Thousands of farmers who thumb through their almanacs, as well as astronomy-minded city dwellers who turn to the weather page of their newspapers, may be puzzled when they learn the rising and setting times of the sun for the next couple of weeks. Immediately after the shortest day, the sun will stubbornly refuse to rise earlier; in fact, it will actually be rising later by the clock. On the other hand, it will begin setting later, by three to six minutes every day. In other words the day, as measured by our clocks, will be lengthening lopsidedly in the afternoons while shrinking in the mornings.

Only after January 11 will the sun begin to clip minutes off its rising time. In the latter half of February, the length of daylight will be growing with equal speed in the morning and the evening. After that the mornings will start growing more rapidly than the afternoons. Such shiftings will be repeated several times through the year.

The amateur observer feels instinctively that something is wrong. He is right. The period of daylight does lengthen and shorten equally at sunrise and sunset. If we measured time by the sun, with a sundial, this would be obvious. It is the arbitrary clock time which we are forced to use that gives us the illusion of an unbalanced growth or shrinking of daylight.

The reason the time we live by must be arbitrary and "synthetic" is that the several motions of the earth in relation to the sun get in each other's way, so to speak. If the sun and earth stood still in space, while the earth continued to rotate on its axis as it does now, the length of time required for each rotation would be equal. Each day from noon to noon would be the same length, and a perfect unit for measuring time.

Why the Day Is Longer than 24 Hours

But instead of remaining at the same place, the earth must rotate while it is really hurtling along on its yearly oblong track round the sun, traveling forward about 1,600,000 miles every 24 hours. This means that the earth must make a little more than one full rotation in order that a given point on its surface may be turned back toward the center of the sun. Our average clock day includes the lap-over time; it is this "oversize" day of one-rotation-plus, from sun noon to sun noon, that is divided into 24 hours.

But there is still another inequality, due to the fact that the earth does not travel around the sun at a steady speed. It moves most rapidly in winter, when it is closest to the sun, and slows down in summer, when it is farthest away. The swiftly moving earth travels farther than the average each winter day and must therefore turn through a greater "overlap" than the average in order to reach the noon position. The slow-moving earth of summer travels a relatively short dis-

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But it was noticeable that railroads and highways ran on low fills; there was never a cut unless the road swung into the narrow strip of sand hills that serves as a natural dike along the North Sea. Inland from this sandy ridge the land seemed at a dead level. There are no rocky areas, only sand, clay, and mud. Brick is the almost universal building material.

Although picturesque costumes are still worn in some rural districts, the Yank will discover few of them in any of the larger cities. In peacetime he would have had to search hard to find people wearing wooden shoes; now, because war brought leather shortages, he may find them in wider use.

One of the most vivid impressions of the Netherlands may be given to the Yank by bicycles. In normal times old and young rode them—at least one out of three. Babies lay sleeping in handle-bar baskets; tiny tots rode behind pedaling mothers, clutching their skirts. Schools provided "parking rooms," filled during class hours.

During rush hours in peacetime Amsterdam bicyclists rode in droves like regiments on wheels, and stopped in unison when traffic lights flashed red.

Note: The Netherlands appears on the Society's Map of Germany and Its Approaches, which was a supplement to the July, 1944, issue of the *National Geographic Magazine*.

For additional information about the Netherlands, see "Low Countries Await Liberation," 10 photographs of the Netherlands and Belgium, in the August, 1944, issue of the *Magazine*; "Behind Netherlands Sea Ramparts," February, 1940*; "A New Country Awaits Discovery," September, 1933; and "Vacation in Holland," September, 1929*.

See also these GEOGRAPHIC SCHOOL BULLETINS: "Walcheren Island, Sentinel of the Schelde Estuary" (Geo-Graphic Brevity), November 27, 1944; "Cities of Southern Netherlands Combine History and Industry," November 20, 1944; "The Netherlands a Water-Ruled Vestibule to Germany," October 9, 1944; and "IJmuiden, Nazi E-Boat Nest in the Netherlands," April 17, 1944.

Bulletin No. 3, December 18, 1944.

K.L.M. Royal Dutch Airlines

IN PLACES THE HALF-AND-HALF NETHERLANDS IS MORE THAN HALF WATER

The Waal arm of the Rhine River (foreground) joins the Maas River to form the Hollandsch Diep (upper center), which is crossed by the Moerdijk railway bridge, one of the longest in Europe. In May, 1940, at the start of the ruthless Nazi campaign in the neutral Netherlands, German troops seized this bridge in a surprise attack. Sections of the span had been destroyed before the Allies reached its southern approaches in 1944. These waterways, plus the Lek arm of the Rhine to the north and the Schelde to the south, create a composite delta that makes the entire southwest section of the Netherlands half land and half water, with a preponderance of water in spots. Patiently working through the centuries, Netherlanders had diked and drained their lowlands areas so well that a surprising percentage was good farmland. The present war is ruining thousands of these man-made acres by flooding them with sea water.

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Geo-Graphic Brevities

PRINTING, MARSEILLAISE, AND GEESE BROUGHT FAME TO STRASBOURG

STRASBOURG, taken by French troops in their sudden lunge to the Rhine, has repeatedly been fought over in the endless struggles between Germany and France for the buffer area of Alsace-Lorraine. The printing press and a world-renowned song have helped its fame. There Gutenberg carried on some of his early experiments in printing, and there also Rouget de Lisle composed France's Revolutionary anthem which came to be called "The Marseillaise."

A prewar city of 193,000 people, Strasbourg combined French and German influences. It was a rail center on the French side of the Rhine at the head of main navigation on that great river highway. The Rhine-Rhône Canal ended there. A million and a half tons of shipping were landed annually at Strasbourg's port.

Strasbourg is noted for its cathedral, which has a rose window 50 feet in diameter; for its university, where Goethe studied; and for its pâté de foie gras (goose-liver paste). The goose is the "national bird" of Strasbourg.

The preparation of pâté de foie gras from goose livers and truffles dates from 1762, when the delicacy was devised by one Close, cook to the Maréchal de Condé, then living in Strasbourg. This product has since become universally popular. The city's annual output before the war exceeded a half-million dollars in value.

With rail and cheap river transportation to bring coal and iron ore from the Ruhr and Saar valleys, many heavy industries developed at Strasbourg, later aided by hydroelectric power from Switzerland and the Vosges Mountains.

Argentoratum to the Romans, Strasbourg was founded on an island in the Ill River, before history began, and gradually grew eastward to the Rhine. Its several waterways give it a Venetian aspect. Before the war there remained medieval half-timbered houses, Gothic churches, and stone buildings of Renaissance design.

Note: Strasbourg may be located on the National Geographic Society's Map of Central Europe and the Mediterranean, which appeared as a supplement to the October, 1939, issue of the *National Geographic Magazine*.

* * * * *

MODERN TOKYO HAS OUTGROWN ITS TINDERBOX REPUTATION

MODERN steel and concrete business buildings and apartment houses rise near "matchbox" areas of unpainted wood and bamboo dwellings in Tokyo, world's third-largest city. The recent bombings by Superfortresses have raised the question of how severely an air raid might damage the Japanese capital.

The strikingly new and Western appearance of Tokyo's modern districts is the result of the 1923 earthquake and fire which destroyed nearly half the city. Reconstruction was done with materials and in architectural styles which the Japanese hoped would withstand future earthquakes (illustration, inside cover).

More than half the dwellings, however, are one story high, and most of them are relatively inflammable. They are mixtures of Japanese tradition and 20th century conveniences. Electric lights and radios appear in rooms where mats on the wooden floors serve for chairs and beds (illustration, next page).

Tokyo is not only the Nipponese capital, but also one of Japan's greatest industrial areas. Before a recent move to decentralize industry it had about 43,000 factories of all sizes. Though the average did not employ more than 10 workers,

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tance each day and so has a less-than-average overlap. The sun-measured day, therefore, is almost always either longer or shorter than 24 hours.

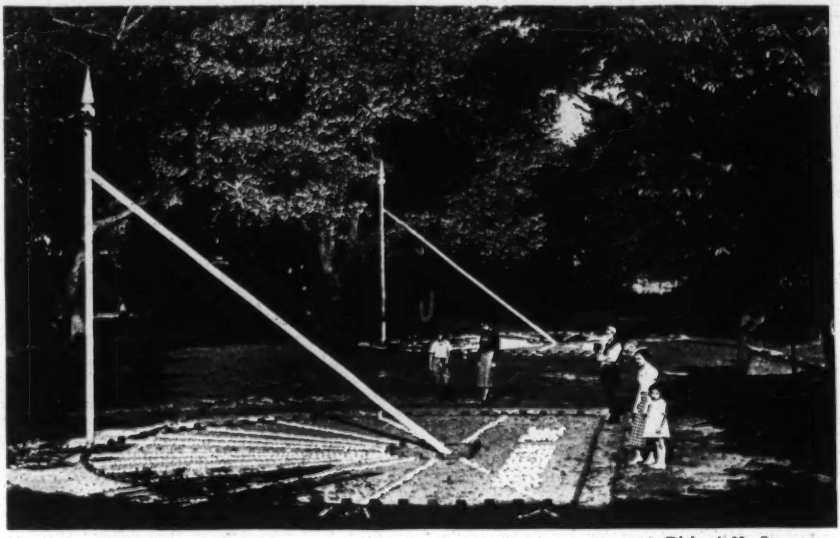
The small differences in the lengths of days from noon to noon (a maximum of about 30 minutes) did not bother primitive man. He didn't know they existed. But when civilization passed beyond the sundial era (illustration, below), when the science of astronomy grew up, measurements could be made of the movements of the heavenly bodies, and the varying lengths of days were discovered. In those days clocks could not be made that would allow for these differences. So it was agreed that clocks should measure an average day of exactly 24 hours rather than the actual day of seasonal variations.

It turns out that after the average day and the actual day are started off together about December 26 (near the winter solstice), clock time is always either "ahead of the sun" or behind it by varying amounts, except about April 15, about June 14, and about September 1. The exact differences in minutes and seconds for each day are shown in tables used by astronomers and navigators. This difference is called "the equation of time." When added to or subtracted from clock time, it will give the actual time.

The greatest irregularity in time—the rising of the sun apparently later and later in late December and early January—is ironed out completely when the equation of time is subtracted from the apparent rising times. This reveals that the sun's rising time is actually earlier, in spite of what the clock says. Similarly, applying the equation of time removes all other apparent irregularities during the remainder of the year.

Note: For further information on astronomy, see "News of the Universe," in the *National Geographic Magazine* for July, 1939*.

Bulletin No. 4, December 18, 1944.



Richard H. Stewart

SISTER SUNDIALS POINT ACCUSING FINGERS TO THE TIME-TANGLING SUN

Two sundials at the railroad station in Dodge City, Kansas, tell two different stories about the time, but you must take both with a grain of salt—and astronomy—or you may miss your train. At Dodge City times change; in the Central Time Zone to the east, clocks are one hour ahead of those in the Mountain Time Zone to the west. These pointers are constructed to make one dial show Mountain time, the other Central. But sun time is faster or slower than clock time, because the sun swings the earth along more quickly in winter and more slowly in summer. So a tablet mounted in front of the sundials (extreme right) shows how many minutes to add or subtract from each sundial's time to find the clock time by which railroads run.

some plants were immense. In peacetime a third of the factories processed foodstuffs, and another third made metal products, machines, and tools. There also were many textile mills and chemical and woodworking plants as well as some aircraft plants.

Five thousand bridges, largely of stone or iron and concrete, cross Tokyo's network of canals and rivers. Although the Sumida River provides a wide but shallow harbor, most of Tokyo's shipping is handled from the port of Yokohama, less than 20 miles distant.

In the early part of the last decade Tokyo enlarged its boundaries to take in 82 suburban villages. Now its estimated population of 6,580,000 is exceeded only by the peacetime populations of London and New York. Like New York, Tokyo is a city of commuters; its workers travel daily by subways, buses, trolleys, and bicycles. Unlike New York, however, it has no skyscrapers.

Note: Tokyo appears in a large-scale inset on the Society's Map of Japan and Adjacent Regions, which was published as a supplement to the April, 1944, issue of the *Magazine*.

For additional information about Tokyo, see "Japan and the Pacific," by Joseph C. Grew, former Ambassador to Japan, in the *National Geographic Magazine* for April, 1944; "Women's Work in Japan," January, 1938*; and "Tokyo Today," February, 1932*.

"Tradition Lingers in Modern Japan," 11 natural-color photographs identical with those appearing in the January, 1938, issue of the *Magazine*, and "Castles, Shrines, and Parks of Japanese Pilgrimage," 10 natural-color photographs identical with those in the *Magazine* for April, 1936, are available as separate color sheets for school use. A subject list of color sheets will be sent upon request to the Society's headquarters.

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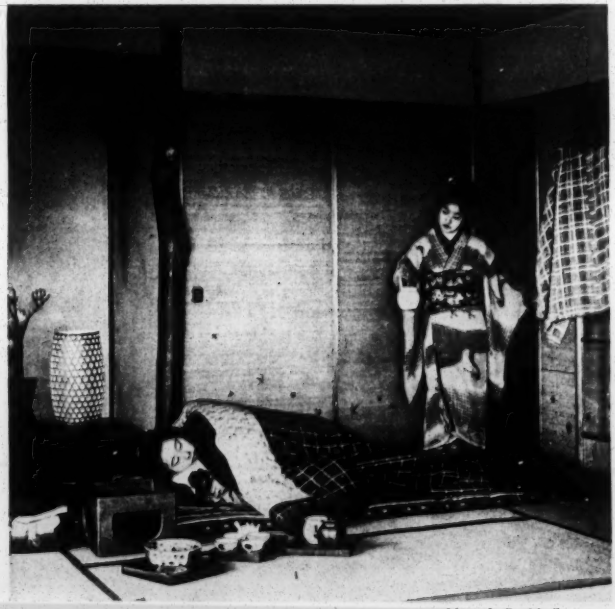

Mrs. J. B. McGovern

MOST JAPANESE HOMES ARE STILL OF TINDERBOX CONSTRUCTION

This is the type of all-wood-and-paper house that caught fire instantly during the 1923 Tokyo earthquake. This is also Tokyo's chief air raid hazard, though many homes now have fire-resistant features. Partitions are sometimes paper. Houses and small inns are often built around miniature garden courts, which become flues once a fire ignites the structures. Here the lady of the house retires on a padded mattress on the floor. The box at her head holds an urn filled with glowing charcoal for warmth. The maid has served tea.